



Sampling and Analysis Plan Amendment No. 3 Phase II Remedial Investigation IRP Site 1 FORMER MARINE CORPS AIR STATION EL TORO, CALIFORNIA

January 2005

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Prepared under:
**Comprehensive Long-Term Environmental Action Navy
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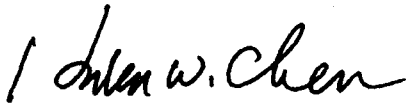
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**Sampling and Analysis Plan Amendment No. 3
Phase II Remedial Investigation
IRP Site 1, Explosive Ordnance Disposal Range
Former MCAS El Toro, California**

**Contract No. N62742-94-D-0048
Contract Task Order No. 0072**

Reviews and Approvals:



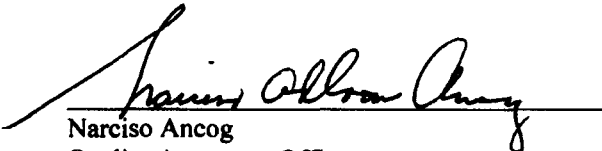
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PAGE NO. iv

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FINAL WORK PLAN
PHASE II REMEDIAL INVESTIGATION IRP SITE,
EXPLOSIVE ORDNANCE DISPOSAL RANGE

DATED 27 NOVEMBER 2001

IS ENTERED IN THE DATABASE AND FILED AT
ADMINISTRATIVE RECORD NO. M60050.002577

AMENDMENT NO.1
TO THE WORK PLAN
PHASE II REMEDIAL INVESTIGATION IRP SITE
EXPLOSIVE ORDNANCE DISPOSAL RANGE

DATED 21 NOVEMBER 2002

IS ENTERED IN THE DATABASE AND FILED AT
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DRAFT FINAL
SAMPLING AND ANALYSIS PLAN
AMENDMENT NO.1 - PHASE II
REMEDIAL INVESTIGATON IRP SITE
EXPLOSIVE ORDNANCE DISPOSAL RANGE

DATED 3 MARCH 2004

IS ENTERED IN THE DATABASE AND FILED AT
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FINAL SAMPLING AND ANALYSIS PLAN
AMENDMENT NO.1 - PHASE II
REMEDIAL INVESTIGATON IRP SITE
EXPLOSIVE ORDNANCE DISPOSAL RANGE

DATED 1 DECEMBER 2004

IS ENTERED IN THE DATABASE AND FILED AT
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AMENDMENT NO. 2
TO THE WORK PLAN
PHASE II REMEDIAL INVESTIGATION IRP SITE,
EXPLOSIVE ORDNANCE DISPOSAL RANGE

DATED 4 DECEMBER 2002

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CONTENTS

SIGNATURE PAGE	iii
ACRONYMS AND ABBREVIATIONS	vii
1. INTRODUCTION	9
2. IRP SITE 1 BACKGROUND	10
3. RATIONALE FOR THE AMENDMENT	11
4. DATA QUALITY OBJECTIVES	12
4.1 Problem Statement	12
4.2 Project Decisions	12
4.3 Decision Inputs	12
4.4 Study Boundaries	12
4.5 Decision Rules	12
4.6 Decision Error Limits	12
4.7 Sampling Design	12
5. FIELD SAMPLING PLAN	17
5.1 Groundwater Sampling	17
5.2 Sample Collection, Shipping, and Documentation	17
6. QUALITY ASSURANCE PROJECT PLAN	18
6.1 Project Management	18
6.2 Measurement and Data Acquisition	18
6.3 Project QA Oversight	18
6.4 Data Validation and Usability	18
7. REFERENCES	19

FIGURES

4-1	Proposed Hydropunch Sampling Locations	15
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TABLES

5-1	Requirements for Groundwater Sample Preservation, Maximum Holding Time, and Containers	17
6-1	Project Quality Control Criteria for Groundwater Samples	18

PAGE NO. vi

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ACRONYMS AND ABBREVIATIONS

BCT	BRAC Cleanup Team
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
CLEAN	Comprehensive Long-Term Environmental Action Navy
EOD	explosives ordnance disposal
IRP	Installation Restoration Program
MCAS	Marine Corps Air Station
NFECSW SDIEGO	Southwest Division, Naval Facilities Engineering Command
OE	ordnance and explosives
RI	remedial investigation
SAP	sampling and analysis plan
SOP	standard operating procedure
USEPA	United States Environmental Protection Agency

PAGE NO. viii

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1. INTRODUCTION

This document is an amendment to the Final Work Plan, Phase II Remedial Investigation (RI), Installation Restoration Program (IRP) Site 1, Explosives Ordnance Disposal (EOD) Range, Marine Corps Air Station (MCAS) El Toro, California (Earth Tech 2001) (Work Plan). The Work Plan included the elements of a Sampling and Analysis Plan (SAP). The purpose of this amendment is to propose additional investigation of groundwater downgradient of IRP Site 1 at the former MCAS El Toro, California.

This document is to be used in conjunction with the Work Plan. This amendment supports the recommendations of the memorandum dated December 3, 2004 **Remedial Investigation Tier III-C Assessment Results, IRP Site 1, Former MCAS El Toro** (Technical Memorandum) and should be used in conjunction with that document. Except as noted, no other changes to the Work Plan are made.

This SAP amendment was prepared for the Base Realignment and Closure (BRAC) Program Management Office West and Southwest Division, Naval Facilities Engineering Command (NFEC SW SDIEGO; formerly abbreviated as SWDIV), as authorized by the Pacific Division Naval Facilities Engineering Command under contract task order number 0072 of the Comprehensive Long-Term Environmental Action Navy (CLEAN) II program, contract number N62742-94-D-0048.

2. IRP SITE 1 BACKGROUND

IRP Site 1 is situated in the northeast portion of MCAS El Toro in the foothills of the Santa Ana Mountains. Training for EOD and detonation of munitions has been conducted at Site 1 from 1952 to base closure in 1999. Potential contamination of groundwater is also expected due to leaching of contaminants from the soil; therefore, various investigations were performed at Site 1, with each investigation targeted toward specific environmental media or contaminants, to adequately define the nature and extent of contamination at the site. These studies defined the physical characteristics of Site 1, including geology, hydrogeology, and ecology, and estimated the nature and extent of contamination at the site. An overview of the results of these investigations is presented in the Work Plan.

3. RATIONALE FOR THE AMENDMENT

As detailed in the Technical Memorandum, perchlorate concentrations in groundwater south of Site 1 and the correlating hydrogeologic environments are complex. Additional investigation is required to further assess the lateral and vertical distribution of perchlorate between Site 1 and Site 2, to assess the potential existence of paleochannels in the recent alluvial sediments in the wash (if any), and to provide screening data for the possible future siting of groundwater monitoring wells (if necessary).

4. DATA QUALITY OBJECTIVES

The data quality objectives and the decision rules presented in the Work Plan have been changed to incorporate additional measurements required to resolve the decision questions.

4.1 PROBLEM STATEMENT

Perchlorate has been detected in groundwater downgradient of Site 1. Existing data is insufficient to characterize the lateral and vertical extent of this perchlorate plume. It is unknown if this perchlorate is associated with Site 1 releases or another unidentified source. Additional information on geology and hydrogeology is necessary to refine the site conceptual model.

4.2 PROJECT DECISIONS

Do the data suggest that the perchlorate detected downgradient from Site 1 is related to Site 1 releases?

4.3 DECISION INPUTS

Perchlorate data will be collected to define nature and extent of perchlorate contamination in the study area. Geology and hydrogeology of this downgradient area will be interpreted based on Hydropunch™ data. Anion and cation concentrations may help to assess the hydrogeochemistry of the impacted groundwater.

4.4 STUDY BOUNDARIES

The extent of the perchlorate releases subject to assessment and the planned locations of borings are presented in Figure 4-1. The depth to bedrock will be part of the assessment and constitutes the vertical boundary of the investigation.

4.5 DECISION RULES

If perchlorate concentrations and lithology data support the site conceptual model proposed, then the perchlorate in the wells may be assumed to be an extension of the release from Site 1.

4.6 DECISION ERROR LIMITS

Qualitative decision errors presented in the Work Plan are not changed.

4.7 SAMPLING DESIGN

Hydropunch™ samples will be collected as shown in Figure 4-1. The sample locations were selected based on the geologic and lithologic conceptual site model and will be sited according to the positions shown in the drawing. The field geologist will utilize bearings from landmarks to site the boring locations. Locations will be surveyed after the sampling is performed.

The lines of boreholes will consist of four to five continuously cored hollow-stem auger (HSA) penetrations arrayed in lines crossing the wash to provide reasonable resolution across this aquifer. The boreholes will proceed with continuous coring to first encountered groundwater. After groundwater is encountered, a sample of the groundwater will be collected via Hydropunch™. After sufficient groundwater sample has been withdrawn, the borehole will be further advanced until the feldspathic sandstone bedrock is encountered. Each core will be logged for both soil type (by USCS) and characteristics such as reactivity with hydrochloric acid (HCl) and bedrock depth. Coring will

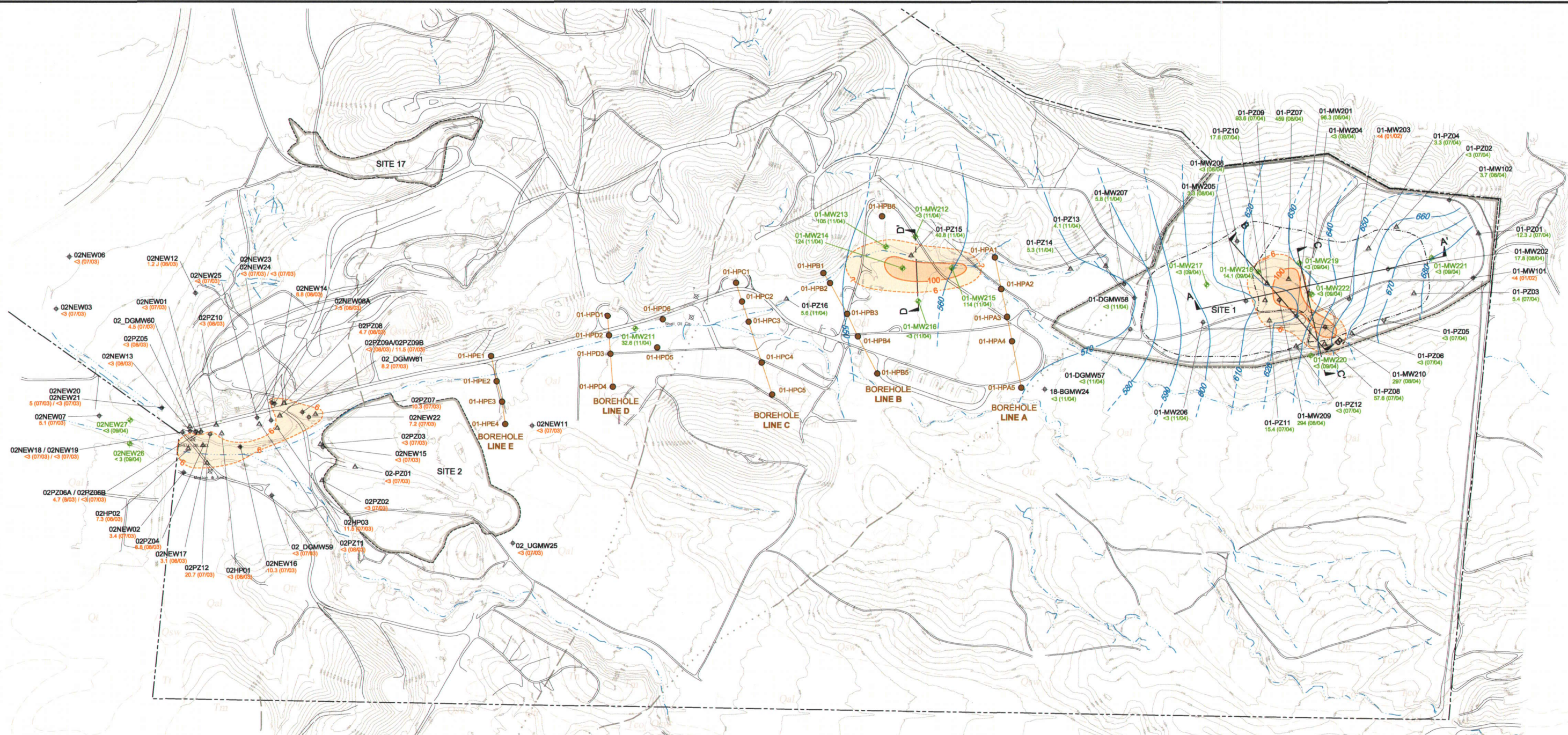
continue to an approximate depth of 5-10 feet within the bedrock. At two locations along each line of boreholes, an attempt will be made to obtain a sample of groundwater within the bedrock matrix to assess the vertical distribution of perchlorate. If Hydropunch™ refusal is encountered, the auger will be backed out a few feet to allow an attempt to collect a bailed groundwater sample through the augers.

The groundwater sampler operates by advancing 1 ¾ inch hollow push rods with the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired sample depth, the push rods are retracted; exposing the encased filter screen and allowing groundwater to infiltrate hydrostatically from the formation into the inlet screen. A small diameter bailer (approximately ½ or ¾ inch) is lowered through the push rods into the screen section for sample collection. Samples are collected for analysis of perchlorate. Depending on the results, additional groundwater monitoring wells may be installed.

Samples for groundwater quality parameters, shown in Table 6-1, will be collected from existing and new groundwater wells, depending on the distribution of perchlorate, the screened zones of the wells, and lithology identified in the Hydropunch™ to compare groundwater characteristics, assessing whether the source waters are chemically related.

PAGE NO. 14

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- LEGEND:**
- 01-HPA5 ● PROPOSED HYDROPUNCH SAMPLING LOCATION
 - 01-MW219 ◆ NEWLY INSTALLED GROUNDWATER MONITORING WELL (CONTINUOUS CORE COLLECTED)
 - 550 --- GROUNDWATER CONTOUR ELEVATION, DASHED WHERE INFERRED (GROUNDWATER ELEVATIONS COLLECTED ON NOVEMBER 5, 2004)
 - 01-MW209 ◆ EXISTING GROUNDWATER MONITORING WELL
 - 01-PZ11 ▲ EXISTING PIEZOMETER
 - 459 (08/04) PERCHLORATE CONCENTRATION (MONTH AND YEAR INDICATED)
GREEN INDICATES RECENT DATA
INDICATES ESTIMATED VALUE
 - MCAS EL TORO BOUNDARY
 - EOD RANGE BOUNDARY
 - IRP SITE BOUNDARY (1, 2, AND 17)
 - STREAM OR WASH (INTERPOLATED FROM TOPOGRAPHIC DATA)
 - EXISTING FENCE

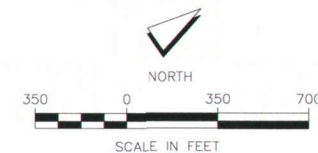
- 6 --- INFERRED PERCHLORATE ISO-CONCENTRATION CONTOUR ABOVE 6 µg/L (BASED ON NOVEMBER 2004 SAMPLING AND PREVIOUS ROUNDS), QUERIED WHERE UNCERTAIN
- 100 --- INFERRED PERCHLORATE ISO-CONCENTRATION CONTOUR ABOVE 100 µg/L (BASED ON NOVEMBER 2004 SAMPLING AND PREVIOUS ROUNDS)
- GEOLOGIC FAULT, DOTTED WHERE INFERRED
- C C' CROSS-SECTION LOCATION

DESCRIPTION OF MAP UNITS:

- Qal Flood Plain and Stream Channel Deposits (Holocene and Late Pleistocene)
- Qsw Sheetwash Deposits (Holocene to Middle Pleistocene)
- Qtr Trail Ridge Sands (Pleistocene)
- Tn Niguel Formation
- Tco Oso Member
- Tm Monterey Formation (Miocene)
- Tt Topanga Foundation (middle Miocene)
- Tvs Sespe and Vaqueros Formations

DRAFT
FOR DISCUSSION
PURPOSES ONLY

FINAL REVIEW
PENDING



Phase II RI		SAP Amendment No. 3	
<div>Site 1</div> <div>Proposed Hydropunch Sampling Location Map</div>			
Date: 12-04	Former MCAS El Toro		Figure 4-1
Project No. 36097	<div>EarthTech</div> <div>A Tyco International Ltd. Company</div>		

PAGE NO. 16

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5. FIELD SAMPLING PLAN

Fieldwork will be performed in accordance with applicable CLEAN standard operating procedures (SOPs) (BNI 1999). Earth Tech field personnel will have copies of all referenced SOPs during the fieldwork. Approved CLEAN SOPs were submitted to the BCT by NFECSW SDIEGO; copies of the SOPs can be provided to reviewers of this document upon request.

5.1 GROUNDWATER SAMPLING

During the lithological investigation, groundwater samples will be collected utilizing a Hydropunch™ device for analysis of perchlorate. The Hydropunch™ allows for samples to be collected without installation of a permanent monitoring well. The result of analysis of the samples will be used to optimize location of any needed wells.

Samples are collected in a device that is advanced to the desired depth by pushing or drilling. The device is screened to allow water to flow into it and then pulled back to the surface, where the sample is decanted into appropriate containers.

A field duplicate will be collected by withdrawing the Hydropunch™ device and reinserting it to collect a second sample.

The Hydropunch™ device will be decontaminated between sample collection in accordance with CLEAN Standard Operating Procedures. A field equipment rinsate will be collected daily to verify decontamination procedures.

Groundwater samples for perchlorate and water quality parameters will be collected in accordance with the Work Plan (Earth Tech 2001) and applicable CLEAN SOPs.

5.2 SAMPLE COLLECTION, SHIPPING, AND DOCUMENTATION

Sample packaging and shipment will be in accordance with Section 4.2.8 of the Final Work Plan for Phase II RI at Site 1 (Earth Tech 2001).

Samples for perchlorate will be collected in accordance with the Work Plan. General chemistry parameters will be collected as shown in Table 5-1. Samples will be filtered in the field through 0.45µm filter cartridges.

Table 5-1: Requirements for Groundwater Sample Preservation, Maximum Holding Time, and Containers

Analyte Group	Preservation	Maximum Holding Time	Number x Sample Container Type
General chemistry metals	HNO ₃ to pH<2	6 months	1 250 ml plastic
Total organic carbon	HCl to pH<2	14 days	1 250 ml glass
General chemistry	Cool to 4°C	24 hours	1 1L plastic

6. QUALITY ASSURANCE PROJECT PLAN

6.1 PROJECT MANAGEMENT

Project task organization and project organization are described in Section 5.1 of the Final Work Plan for Phase II RI at Site 1 (Earth Tech 2001).

6.2 MEASUREMENT AND DATA ACQUISITION

Quality assurance requirements for data acquisition are presented in Section 5.2 of the Final Work Plan for Phase II RI at Site 1 (Earth Tech 2001). Table 6-1 presents updated quality control criteria for perchlorate and quality control criteria for water quality characteristics.

Table 6-1: Project Quality Control Criteria for Groundwater Samples

Analyte	Method	Laboratory Reporting Limit	Project Decision Threshold	Precision (RPD)	Accuracy (%R) ^a	
					MS/MSD	LCS
Perchlorate (ug/L)	EPA 314.0	3	6	20	75–125	80–120
General Chemistry (mg/L)						
Alkalinity (carbonate, bicarbonate, hydroxide)	SM2320B	2	NA	20	75–125	80–120
Calcium	6010B	0.1	NA	20	75–125	80–120
Chloride	300	1	NA	20	75–125	80–120
Magnesium	6010B	0.05	NA	20	75–125	80–120
Potassium	6010B	1	NA	20	75–125	80–120
Sodium	6010B	1	NA	20	75–125	80–120
Sulfate	300	1	NA	20	75–125	80–120
Nitrate	300	1	NA	20	75–125	80–120
Total dissolved solids	160.1	10	NA	20	75–125	80–120
Total organic carbon	SM5310-D	0.2	NA	20	75–125	80–120

Notes:

µg/L = micrograms per Liter
LCS = laboratory control sample
MS = matrix spike
NA = not applicable

^a Laboratory-specific performance criteria.

RPD = relative percentage of difference
%R = percent recovery
MSD = matrix spike duplicate

6.3 PROJECT QA OVERSIGHT

Requirements for project quality assurance oversight are presented in Section 5.3 of the Final Work Plan for Phase II RI at Site 1 (Earth Tech 2001).

6.4 DATA VALIDATION AND USABILITY

Standards for chemical data validation and usability are presented in Section 5.4 of the Final Work Plan for Phase II RI at Site 1 (Earth Tech 2001).

7. REFERENCES

Earth Tech. 2001. *Final Work Plan, Phase II Remedial Investigation, IRP Site 1, Explosives Ordnance Range, Marine Corps Air Station El Toro, California*. Honolulu, HI. November.